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Cost and affordability of the food basket in the Republic of Moldova

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Introduction: Food and nutrition security remain among humanity's most urgent challenges, with 23.5% of Moldova's population experiencing food insecurity. Despite the critical nature of this issue, national-level research on nutritional security remains scarce. This study aims to evaluate the cost and accessibility of minimum consumption and healthy food baskets in Moldova to better understand affordability constraints and inform policy interventions.

Methods: The study assesses the cost and affordability of food baskets by calculating their cost as a proportion of the country's minimal subsistence amount and evaluating affordability using the International Poverty Line (IPL) criterion. The analysis focuses on two key food baskets: the Minimum Consumption Food Basket (MCFB) and the Healthy Food Basket (HFB).

Results: Findings indicate that ~52% of the population lacks access to the MCFB, while 78.6% cannot afford the HFB without reallocating non-food expenses. Affordability gaps were most pronounced among lower-income households, highlighting significant vulnerabilities within specific socio-demographic groups.

Discussion: These results underscore the urgent need for policies addressing food affordability and accessibility in Moldova. Strengthening national strategies to align with Sustainable Development Goals (SDGs) 2 (Zero Hunger) and 3 (Good Health and Wellbeing) could help mitigate food insecurity risks. By addressing affordability gaps and ensuring equitable access to nutritious food, these strategies can support national development priorities and enhance food security resilience.

KEYWORDS

nutritional security, affordable, minimum food consumption basket, minimum quantum of existence, food poverty threshold

1 Introduction

Food and nutrition security remain among humanity's most pressing and critical concerns (Andree et al., 2024). The annual global rankings highlight substantial disparities, with over 2.2 million people facing acute food insecurity. Moldova is sparsely represented in international assessments of food security (Global Nutrition Report, 2023; FAO, 2023b). This study is framed within the context of the United Nations Sustainable Development Goals (SDGs): SDG 2 ("Zero Hunger"), targeting hunger eradication and improved nutrition, and SDG 3 ("Good Health and Wellbeing"), promoting healthy lives. These objectives underpin the research, which focuses on food affordability and accessibility in Moldova—a country with pronounced challenges in these areas.

The Republic of Moldova faces moderate to severe food insecurity, with a rate of 23.5%, exceeding Romania and the Russian Federation and surpassing the European and Eastern European averages (Global Nutrition Report, 2023; FAO, 2023b). Unhealthy diets now represent a greater threat to global health than the combined effects of alcohol, drug, and tobacco use, driving a significant increase in the prevalence of non-communicable diseases, including coronary heart disease, stroke, and diabetes (Willett et al., 2019; Dury and Martin-Prével, 2019; Muonde et al., 2024). In Moldova, ~90% of annual deaths

linked to NCDs (European Commission, n.d.), with CVD, cancer, diabetes, and respiratory diseases accounting for 80% of mortality (Guvernul Republicii Moldova, 2023a; WHO and Ministerul Sănătății al Republicii Moldova, 2021).

Research on food security has grown extensively worldwide, particularly in low- and middle-income countries. Barriers such as cost differences, socio-economic inequalities, and structural challenges limit access to nutritious diets (Herforth et al., 2022; Bai et al., 2021, 2022). However, Moldova and other Eastern European nations are underrepresented in global datasets, highlighting a critical knowledge gap. Unlike the detailed affordability indices available for Western Europe or North America, Moldova lacks comprehensive data linking economic conditions, dietary patterns, and public health. Addressing these gaps is vital for informed policy development and intervention strategies.

At the national level, there is very little research on nutritional security and no designated entity is responsible for assessing and monitoring its levels. Information on critical indicators, such as affordability and access to healthy diets, is fragmented and often lacks robustness. These gaps present major challenges for public health management in Moldova (Obreja et al., 2019; Siminiuc and Țurcanu, 2022; WHO and Ministerul Sănătății al Republicii Moldova, 2021).

The study's goal was to determine the cost and accessibility of minimum consumption food baskets (MCFB) and healthy food baskets (HFB) in Moldova. This is particularly relevant in the context of the urgent need for a global transformation of food systems, as current dietary trends and projected population growth to nearly 10 billion by 2050 exacerbate both the global burden of non-communicable diseases and environmental degradation (Willett et al., 2019).

This study contributes by examining the affordability of minimum consumption and healthy food baskets in Moldova, identifying affordability thresholds and at-risk socio-demographic groups. It provides robust evidence for policymakers to address food access inequalities. Additionally, it fills a critical gap in regional food security research, offering a replicable methodology for underrepresented regions, and serves as a practical tool for development practitioners and donors to promote sustainable food system improvements.

2 Materials and methods

2.1 Research objects

The analysis and calculations conducted to achieve this objective were based on the nutritional evaluation of diet criteria (NEDC), focusing on two types of food baskets: Minimum Consumption Food Baskets (MCFB) and Healthy Food Baskets (HFB; Figure 1).

The MCFB represents the estimated minimum consumption of food products required annually for the main socio-demographic groups (Ministerul Muncii, Protecției Sociale și Familiei, 2013, p. 147; BNS, 2023a). According to the Nutritional Evaluation of Diet (NEED) criteria, existing MCFBs correspond to an adequate nutrient intake basket: they provide sufficient intake of calories and essential nutrients but do not ensure proportionality between food

groups. The set includes 11 food groups providing between 1,990 and 2,780 kcal/day (FAO, 2022, 2023b; Table 1).

The HFB set is a model developed according to the FAO-Health Diet Basket standard, designed to meet dietary recommendations to ensure nutrient adequacy and long-term health. HFB was designed to replace existing MCFB options (Bechthold et al., 2018; Chrysostomou et al., 2017; FAO, 2020, 2023a; Herforth et al., 2022). The HFB includes seven food groups providing an energy range of 2,170 to 2,770 kcal/day (Siminiuc and Țurcanu, 2024a,b).

2.2 Cost estimation

The cost for each MCFB and HFB option was calculated by summing the average consumer prices for each food item, considering the minimum consumption norms for each product. Defined by Government Decision 285/2013, these norms specify the minimum monthly quantities of food products (in kilograms, liters, or dozens) required per person for basic subsistence. While not reference intake values, they establish a baseline for minimum subsistence diet costs. For this study, norms were recalculated in grams per day (Guvernul Republicii Moldova, 2013; Table 2).

Average consumer prices for the items included in the MCFB and HFB options were sourced from the price list of socially important retail products for the period January–December 2023 (average values for 12 months), published by the National Bureau of Statistics (NBS) website (Biroul Național de statistică, 2024; BNS, 2023a). Quantitative food intakes for HFB options are detailed in Table 3.

The cost calculation formula has been explicitly included for clarity (Equation 1):

$$\text{Food Basket Cost (LMU)} = \sum_{i=1}^n (\text{Unit Price (LMU)} \times Q_i) \quad (1)$$

Where:

n , the total number of food items included in the food basket. It defines the upper limit of the summation;

Q_i , the quantity of the i^{th} food item included in the basket;

i , represent each food item in the basket;

LMU, Local Monetary Units.

2.3 Affordability indicators

The Cost and Affordability of a Healthy Diet (CAHD) index is a metric developed by the Food Prices for Nutrition Project, led by researchers from Tufts University in collaboration with the World Bank under the auspices of the United Nations Statistics Commission (The World Bank, 2023b; World Bank, International Comparison Program, 2024). The index provides useful information about the cost of healthy food baskets/diets in countries worldwide and the extent to which populations can afford to consume these diets (Bai et al., 2021; FAO, 2023a; Herforth et al., 2022). The resulting accessibility measures include the percentage and number of people who cannot afford a healthy diet in the Republic of Moldova in 2023.

Affordability is measured by comparing the cost of a healthy diet to the income level in the country. If the cost exceeds 52% of

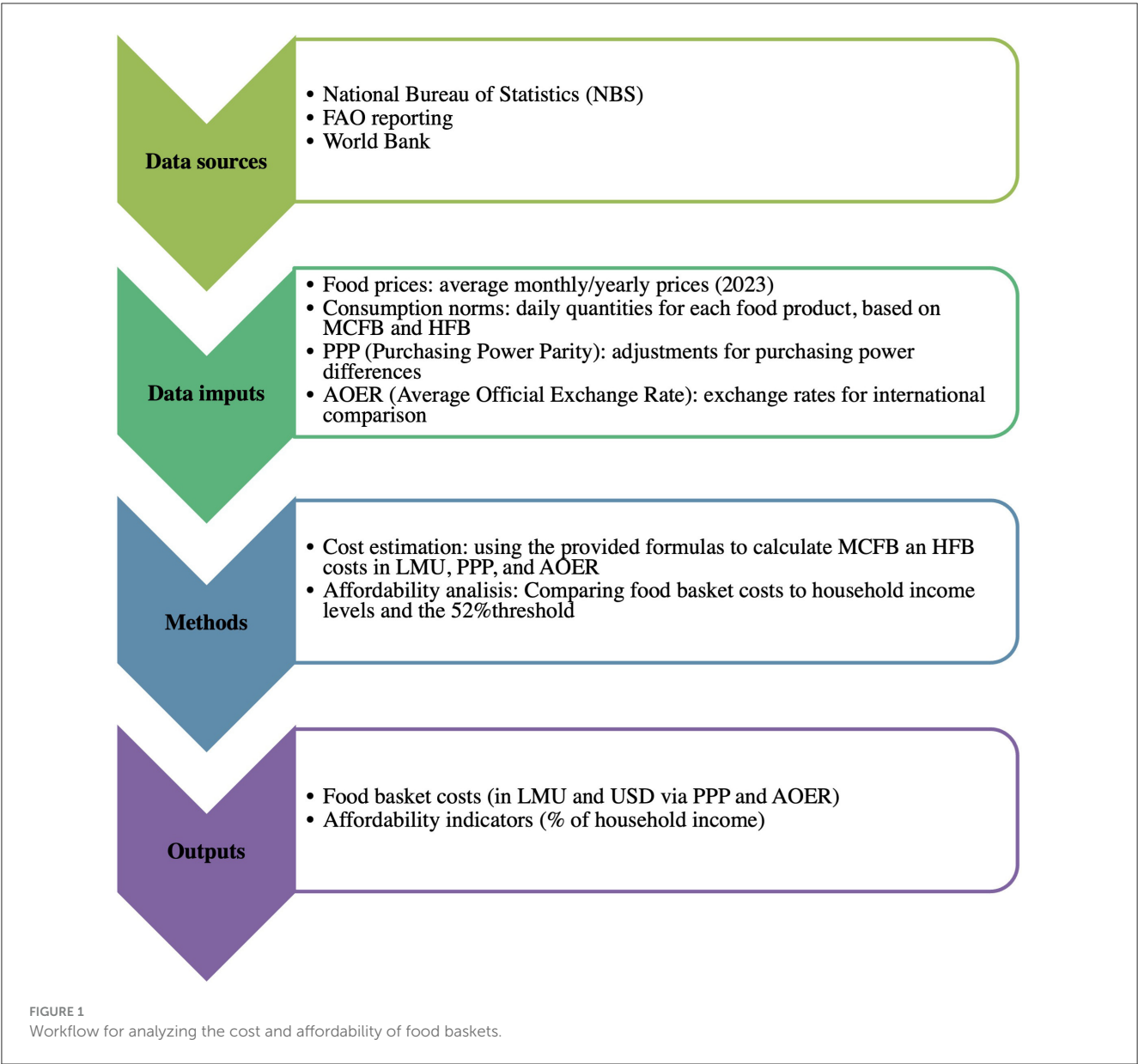


TABLE 1 Energy intake of the food baskets involved in the research.

	Food basket sets	Social-demographic groups	Acronym	Energy intake of baskets, kcal/day
1.	Minimum consumption food baskets	Men (adult)	MCFBm	2,780
		Women (adult)	MCFBw	2,290
		Retirees	MCFBr	1,990
		Weighted average	MCFBwa	2,300
2.	Healthy food basket	Men (adult)	HFBm	2,670
		Women (adult)	HFBw	2,170
		Retirees men	HFBrm	2,470
		Retirees women	HFBrw	2,070

a household's average income, the diet is considered unaffordable (FAO, 2020, 2023a; World Bank, International Comparison Program, 2024). This percentage represents a portion of income that can credibly be allocated for food, based on observations showing that populations in low-income countries spend, on average, 52% of their income on food (FAO, 2023b).

TABLE 2 Consumption norms per food group in MCFB.

	Product groups	Items, n	Consumption norms, g per day			
			MCFBm	MCFBw	MCFBr	MCFBwa
1.	Bread and bakery products	168	462	389	350	374
2.	Meat and meat products	15	108	73	60	85
3.	Milk and dairy products	11	328	378	379	376
4.	Eggs	2	3.3	2.0	1.4	2.7
5.	Fish and fish products	5	33	23	22	25
6.	Sugar and confectionery	4	41	36	27	36
7.	Fats	7	43	37	31	36
8.	Potatoes	1	382	311	269	315
9.	Vegetables	10	333	228	205	261
10.	<i>Cucurbitaceae</i>	2	28	11	9	17
11.	Fruits	6	108	87	60	99

TABLE 3 Consumption norms per food group in HFB.

	Product groups	Items, n	Consumption norms, g per day			
			HFBm	HFBw	HFBrm	HFBrw
1.	Starchy products	167	467	359	432	341
2.	Legumes and nuts	3	80	71	70	66
3.	Protein products (of animal origin)	19	161	134	145	130
4.	Milk and dairy products	11	90	65	80	60
5.	Fats	5	20	14	21	14
6.	Vegetables	12	380	370	360	350
7.	Fruits	4	330	320	320	320

Two standards were applied to determine the accessibility of existing MCFB and HFB:

- The share of food basket costs of the Minimum Quantum of Existence (MQE) was computed as the ratio of the cost of the basket to the country's minimum subsistence quantum derived from the NBS platform (for the year 2023) for each socio-demographic category (BNS, 2023a). This indicator reflects the proportion of the minimum subsistence income required to afford the food baskets, offering insights into affordability disparities across socio-demographic groups.
- The International Poverty Line Indicator (IPL), which is currently calculated as the median national poverty line of 28 of the world's poorest countries (Kharas and Dooley, 2022). In September 2022, the World Bank updated the IPL (extreme) from \$1.90 to \$2.15 (The World Bank, 2023a). This line is most relevant for measuring poverty in low-income countries (Amendola, 2023).

To be able to compare the costs of food baskets with IPL, they were converted to USD by applying two conversion factors: Purchasing Power Parity (PPP) and Average Official Exchange Rate (AOER).

The cost of food baskets was computed using the following equation (Equations 2, 3):

$$\begin{aligned} \text{Food Basket Cost (in PPP)} \left(\frac{\text{USD}}{\text{day}} \right)_{2023} \\ = \frac{\text{Cost of Food Basket (LMU)}}{\text{PPP}_{2023}} \end{aligned} \quad (2)$$

$$\begin{aligned} \text{Food Basket Cost (in AOER)} \left(\frac{\text{USD}}{\text{day}} \right)_{2023} \\ = \frac{\text{Cost of Food Basket (LMU)}}{\text{AOER}_{2023}} \end{aligned} \quad (3)$$

Where:

Purchasing power parity (PPP) is a popular macroeconomic analysis measure that converts different currencies into a common currency and thus equalizes purchasing power by eliminating price level differences between countries (European Commission Eurostat and Eurostat, 2012). This indicator is measured in terms of local currency units (MDL-Moldovan Leu, which represents the national currency of the Republic of Moldova) per USD (OECD, 2024). Thus, the choice of weights makes a big difference in calculations of global growth but little difference in estimates of

aggregate growth in advanced countries (Callen, 2024; European Commission Eurostat and Eurostat, 2012). For the Republic of Moldova, the PPP in 2023 was 5.688 MDL for 1 USD (BNS, 2023a).

Average Official Exchange Rate (AOER). AOER refers to the exchange rate determined by national authorities or the rate specified on the legally sanctioned foreign exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to USD; The World Bank, 2022; World Bank, International Comparison Program, 2024). The AOER of the Republic of Moldova was 18.16 MDL for 1 USD (average 01.01.2023–31.12.2023; The World Bank, 2022).

2.4 Validation of control variables

Data for Minimum Quantum of Existence (MQE)—and PPP (for 2023 y) NBS. The AOER data were obtained from official and reputable sources -World Bank datasets for global economic indicators. IPL and International Food Poverty Line (IFPL)—from FAO reports for international food-related statistics. The values were cross-checked across these multiple sources to identify any discrepancies or inconsistencies. Descriptive statistics, such as mean, median, and standard deviation, were calculated for the datasets to identify any outliers or anomalies.

3 Results

3.1 The share of the costs of food baskets from the minimum quantum of existence

To calculate the share of food baskets from the country's minimum subsistence amount, the cost of HFB options and the cost of MCFB options were calculated in local currency units (MDL/month and MDL/day). The cost of MCFB options was determined to be between 1,486 and 1,786 MDL/month, and the cost of developed HFB options was between 1,978 and 2346.6 MDL/month.

The share of HFB in the country's minimum subsistence amount oscillates in the ranges of 68.3–90.7%, with higher values for the basket of retired men. The share of MCFB in the minimum subsistence amount is lower, with values between 51.4 and 52.0%. The results show that the share for all calculated HFB options exceeds the 52% limit (the international food poverty line index, equivalent to \$1.12), and the share for most MCFB (except for men's baskets), is precisely at the level of this index (Table 4).

And this means that at the national level, more than 50% of the population cannot afford a MCFB and on average, 78.6% of the population cannot afford an HFB without transferring non-food expenses to food expenses. According to the NBS, the share of food baskets in the minimum subsistence quantum is 48.1%, equivalent to 1383.9 MDL (BNS, 2023b). This value is lower than the IPL and differs from the MCFB weight values in the minimum amount of existence.

As of January 1, 2023, Moldova's provisional population was 2.512 million. Of these, 1.974 million people (78.59%) cannot afford nutritious diets, and 1.298 million (51.69%) cannot afford a diet meeting energy and macronutrient requirements (Figure 2).

3.2 Accessibility of the food basket in relation to the IPL

To better understand food basket affordability, MCFB and HFB costs were converted to USD using Purchasing Power Parity (PPP) and Average Official Exchange Rate (AOER) factors. These costs were then compared against the extreme international poverty line (IPL).

Cost conversion to PPP. The results showed that the option cost of HFB in PPP is between \$11.4 and \$13.6/day, and the cost of MCFB is between \$7.2 and \$10.4/day. From the set of HFBs developed and researched, the most expensive is the HFB of adult men (\$13.6/day) and of retired men (\$12.6/day), and the HFB of adult women (\$11.9/day) and retired women require lower expenses (\$11.4/day; Figure 3).

Cost conversion to AOER. The cost of both baskets, converted through AOER, is lower than the costs converted to PPP. Thus, the cost of MCFB options is in the range of 2.3–3.2 USD/day and the cost of HFB options is in the range of 3.6–4.2 USD/day. The results obtained confirm the researchers' claims that healthy food baskets and diets are more expensive compared to baskets that show adequacy only by nutrient and energy content (such as MCFB; Bai et al., 2022, 2021; Herforth et al., 2022; Pourghaderi et al., 2023).

Furthermore, the data obtained reveal that the costs for the entire set of HFB and MCFB, converted to PPP or AOER, surpass the values of the IPL indicator of USD 2.15/day and are much higher than the International Food Poverty Line (IFPL) of \$1.12 per day (52% of IPL; Figure 2). That means that anyone living on <\$2.15 per day is deemed to be in extreme poverty (The World Bank, 2023a).

4 Discussion

Approximately 42%—or 3.1 billion—of the global population could not afford a healthy diet in 2021 (Herforth et al., 2022). In low-income and lower-middle-income countries, the proportions were 86 and 70%, respectively, and in the 10 most affected countries, 90% of the population could not afford a healthy diet (World Bank, International Comparison Program, 2024). Addressing poverty remains a critical global development agenda. Determining the poverty line is the essential first step in its analysis (Nguigi et al., 2023). In defining the food poverty threshold, the subsistence minimum is considered.

The total value of the subsistence minimum consists of the cost of food products (the so-called “food basket”) necessary for a healthy and productive life of a non-disabled person, as well as the minimum costs of non-food consumer products and services (at market prices; Koguashvili and Archvadze, 2020).

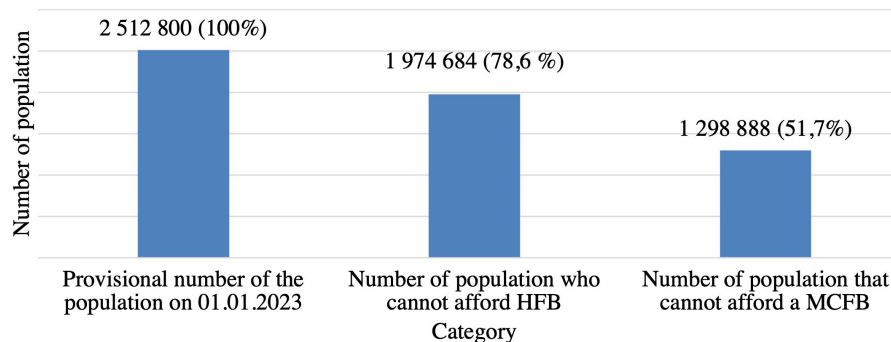
4.1 Key determinants of costs and accessibility

The affordability of food baskets in Moldova is influenced by various economic factors, including inflation rates and household income levels. These trends align with global findings, which

TABLE 4 The share of developed HFB and existing MCFB options from the country's minimum amount of existence, % (average values for the year 2023).

	The FB option	The cost of FB, MDL/day	The cost of FB, MDL/ month	MQE, MDL/month	The share of FB in the MQE, %
1.	MCFBm	58.7	1786.4	3343.4	52.0
	MCFBw	47.4	1442.1	2806.5	51.4
	MCFBr	40.9	1243.4	2403.9	51.7
	MCFBwa	48.8	1485.8	2877.1	51.6
2.	HFBm	77.1	2346.6	3343.4	68.3
	HFBw	67.4	2050.3	2806.5	73.1
	HFBrm	71.6	2179.3	2403.9	90.7
	HFBrp	65.0	1978.4	2403.9	82.3
	FB _{BNS}		1383.9	2877.1	48.1

MQE, minimum quantum of existence provided by the National Bureau of Statistics (NBS), represents the minimum value of goods and services necessary to ensure subsistence, including food and non-food items. For this study, MQE serves as a reference value for comparing the affordability of the Minimum Consumption Food Baskets (MCFB) and Healthy Food Baskets (HFB); FB, Food Basket.

**FIGURE 2**

Number of population, nationally, that cannot afford HFB and/or MCFB without shifting non-food expenditure to food expenditure.

emphasize the role of socio-economic inequalities and structural challenges in limiting access to adequate diets (Bai et al., 2022). Policies addressing these barriers, such as subsidies for nutrient-rich foods or investments in food systems infrastructure, could improve affordability and accessibility.

The food poverty threshold is given by the minimum cost required to achieve an exogenously given minimum energy requirement (ER; Amendola, 2023). During the Soviet period, the U.S.S.R. authorities did not acknowledge the existence of poverty in the country. Instead, this term was substituted with the concept of the minimum consumption basket for granting social allowances as early as 1975. This substitution is valid for many Soviet countries, where poverty is not a taboo but could be camouflaged for political and ideological interests (Harmer and Macrae, 2004; Slay, 2009). Poverty was measured by the quality of life, often reduced to a survival level, which still influences state social policies today. This survival level often still determines the social policy of the state (Platforma informativă Dzen.ru, 2023). In the Republic of Moldova, the last reference to the official poverty threshold was officially presented by the National Bank of Moldova in 2019. Still, the National Bank of Moldova

systematically updates the minimum subsistence quantum (BNS, 2023a).

4.2 Validation of hypothesis

This study confirmed that current food basket standards in Moldova are unaffordable for a significant share of the population and that healthier food baskets impose even greater financial burdens. HFB costs exceeded the 52% affordability threshold relative to minimum subsistence income, underscoring their inaccessibility for most socio-demographic groups. These findings align with global research indicating that healthy diets consistently cost more than calorie-focused alternatives (Bai et al., 2021; Herforth et al., 2022).

Food baskets are a vital tool for evaluating the population's living standard, although the minimum set of products is considered non-objective but conditional. Its importance lies in setting salaries, pensions, scholarships, and allowances (Baizan and Klein, 2019). However, the national MCFB were developed in 2013 and have remained unchanged since then: in terms of energy

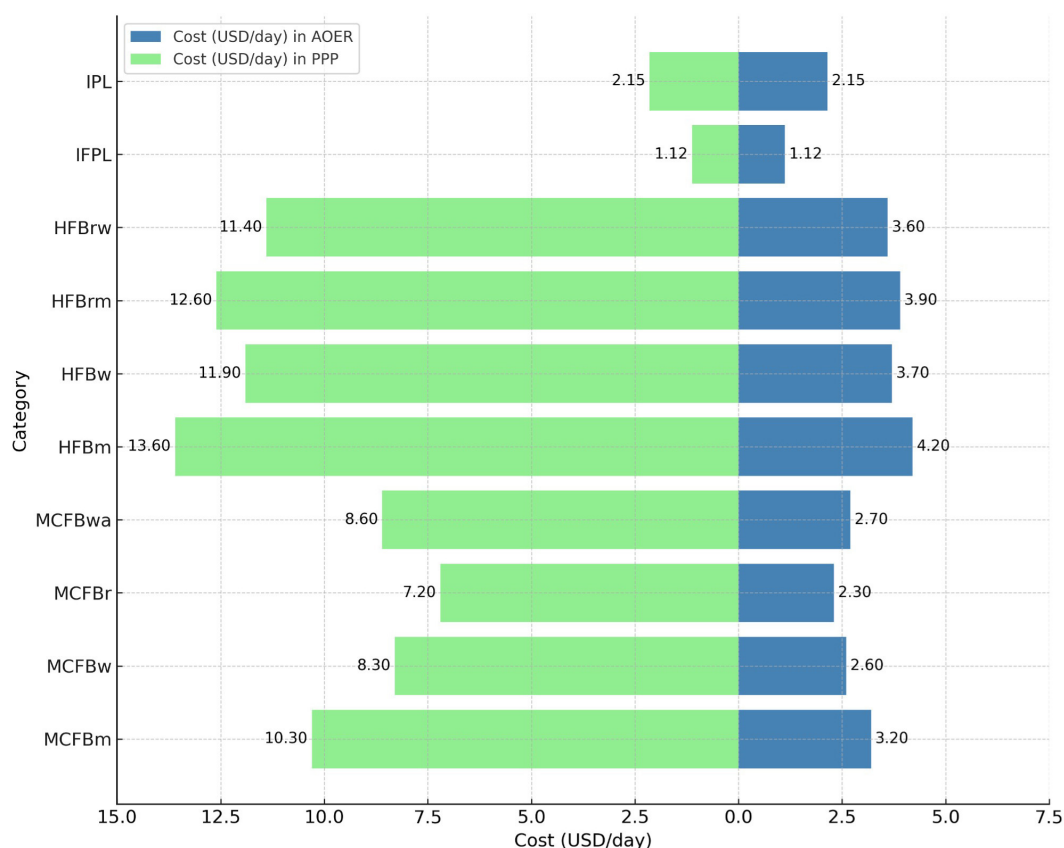


FIGURE 3

Comparative cost of developed HFB options, USD/day (for year 2023). AOER, Average Official Exchange Rate; PPP, Purchasing power parity; IPL, International Poverty Line; IFPL, International Food Poverty Line.

and nutrient intake and consumption norms per food group. The unchanged consumption norms, combined with rising costs, have exacerbated affordability challenges for vulnerable populations.

In both cases, the values obtained are alarming, demonstrating that almost half of the country's population cannot afford the minimum food requirements without transferring non-food expenses to food expenses. The discrepancy of about 3% between the NBS data and the MCFB's cost estimates means another 75,389 people on the absolute poverty line.

4.3 Policy recommendations for Moldova

The findings of this research hold significant application value for Moldova. Policymakers could leverage this data to develop targeted interventions aimed at reducing food insecurity. For instance, implementing government-subsidized programs to reduce the cost of HFBs or introducing tax incentives for local food producers could enhance affordability. Moreover, promoting urban agriculture and farmer cooperatives might increase access to fresh produce, addressing both economic and physical barriers to food security. These

strategies, rooted in the study's results, offer a pathway for Moldova to align more closely with Sustainable Development Goals 2 and 3, which emphasize zero hunger and improved health outcomes.

4.4 Economic comparisons using PPP and AOER

Basket costs (MCFB and HFB) converted to USD by applying the PPP conversion factor deviate from food basket costs converted by using the AOER. The gaps between the values obtained by these two conversion factors are characteristic of emerging and developing countries (Flood, 2002). As a result, developing countries get a much larger share in the aggregation using PPP exchange rates than they do using market exchange rates (Callen, 2024, 2007).

The costs of both MCFB and HFB, converted to USD (applying PPP and AOER), exceed the International Food Poverty Line (IFPL), demonstrating the population's inability to access the minimum food requirement to meet physiological nutrient and energy needs (Siminiuc, 2024). The accurate estimation of the MCFB is essential, as it

underpins the calculation of social payments and forecasts for living standards (Guvernul Republicii Moldova, 2013, 2023b).

4.5 Limitations of the study

The study focuses on the financial affordability of food baskets without addressing factors such as: Infrastructure (e.g., road quality, local markets), distance to supply points, availability of seasonal or imported products. These factors can significantly impact the physical and economic access to food for the population. The calculation of food basket costs assumes constant consumption in line with recommended norms. In reality, dietary behaviors and preferences may vary greatly depending on income, culture, or accessibility. Affordability and accessibility indicators were analyzed at a fixed point in time (the 2023 year). The study does not account for the dynamic nature of these factors, such as accelerating inflation, changes in household income, or the impact of economic crises. The consumption norms used (MCFB and HFB) are theoretical models that may not fully capture the diversity of real-life diets or the dietary preferences of different socio-demographic groups. One limitation of the study is the use of datasets from global sources, which may not fully capture local variations in food prices, dietary habits, and socio-economic conditions in Moldova. As such, some findings should be interpreted with caution when applied to localized contexts.

4.6 Future research directions

While this study offers valuable insights, it also highlights several areas for further exploration. Future research should investigate dynamic factors such as the impact of policy changes and incorporate cultural and behavioral dimensions of dietary preferences to enhance the accuracy and relevance of the MCFB and HFB models. Additionally, examining the interplay between cultural dietary habits and affordability indices could provide deeper insights into food security challenges and opportunities in Moldova.

5 Conclusion

This study evaluated the cost and accessibility of minimum consumption and healthy food baskets in the Republic of Moldova, offering critical insights for food security and public policy at both national and international levels. By estimating the costs of Minimum Consumption Food Baskets (MCFB) and Healthy Food Baskets (HFB), the findings highlight significant affordability challenges, with 78.6% of the population unable to afford an HFB without reallocating non-food expenditures and MCFB costs approaching the 52% affordability threshold, exposing financial

vulnerabilities among certain socio-demographic groups. These results provide a strong evidence base for targeted interventions addressing food insecurity and guiding national policies aligned with Sustainable Development Goals (SDG) 2 (Zero Hunger) and SDG 3 (Good Health and Wellbeing). Moreover, the proposed replicable methodology establishes a practical framework for similar studies in underrepresented regions, fostering the development of equitable, evidence-based policies aimed at improving food affordability and accessibility.

Data availability statement

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

Author contributions

RS: Writing – original draft, Writing – review & editing. DȚ: Writing – original draft, Writing – review & editing. SS: Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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